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OUTCOME-DRIVEN SERVICE PROVIDER PERFORMANCE UNDER CONDITIONS OF COMPLEXITY AND UNCERTAINTY

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by

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14. ABSTRACT While Service-oriented Architecture (SOA)1 can help organizations share resources and leverage economies-of-scale, it can increase acquisition complexity (e.g., multiple new/different relationships to manage) and uncertainty (e.g., nature/magnitude of future service demands). Given this additional complexity and uncertainty, MITRE developed a performance management framework to help Government organizations measurably &#56256;&#56451; Articulate SOA outcomes and identify outcome drivers &#56256;&#56451; Define SOA technical and acquisition performance metrics through the application of Return-on-Investment (ROI) principles and monitor performance as a comparison of current delivery to initial ROI expectations &#56256;&#56451; Translate SOA objectives into contractor performance management mechanisms. This paper describes applying ROI analysis principles for SOA performance management, creating Service-level Agreements (SLAs) to articulate agreements between the Government and external service providers, and managing SLAs through a governance framework (Hanf & Buck, 2009, March). This white paper highlights key findings of research undertaken by The MITRE Corporation (MITRE) and the resulting recommendations for (1) applying Return-on-Investment (ROI) analysis principles as the foundation for more effective performance management of Government Service-oriented Architecture (SOA), (2) creating comprehensive Service-level Agreements (SLAs) to articulate agreements between the Government and external service providers, and (3) managing SLAs through a governance framework (Oakley-Bogdewic & Buck 2009; Hanf & Buck, 2009, March 25). As illustrated in Figure 1, MITRE's recommendations address the additional managerial complexity and uncertainty that SOA objectives and proposed solutions often create.		
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Outcome-driven Service Provider Performance under Conditions of Complexity and Uncertainty

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Abstract

While Service-oriented Architecture (SOA)¹ can help organizations share resources and leverage economies-of-scale, it can increase acquisition complexity (e.g., multiple new/different relationships to manage) and uncertainty (e.g., nature/magnitude of future service demands). Given this additional complexity and uncertainty, MITRE developed a performance management framework to help Government organizations measurably:

- Articulate SOA outcomes and identify outcome drivers;
- Define SOA technical and acquisition performance metrics through the application of Return-on-Investment (ROI) principles and monitor performance as a comparison of current delivery to initial ROI expectations;
- Translate SOA objectives into contractor performance management mechanisms.

This paper describes applying ROI analysis principles for SOA performance management, creating Service-level Agreements (SLAs) to articulate agreements between the Government and external service providers, and managing SLAs through a governance framework (Hanf & Buck, 2009, March).

This white paper highlights key findings of research undertaken by The MITRE Corporation (MITRE) and the resulting recommendations for (1) applying Return-on-Investment (ROI) analysis principles as the foundation for more effective performance management of Government Service-oriented Architecture (SOA), (2) creating comprehensive Service-level Agreements (SLAs) to articulate agreements between the Government and external service providers, and (3) managing SLAs through a governance framework (Oakley-Bogdewic & Buck, 2009; Hanf & Buck, 2009, March 25). As illustrated in Figure 1, MITRE's recommendations address the additional managerial complexity and uncertainty that SOA objectives and proposed solutions often create.

¹ SOA is an architectural style that guides all aspects of creating/applying business processes through service packaging and defines/provisions the Information Technology (IT) infrastructure (Newcomer & Lomow, 2005).

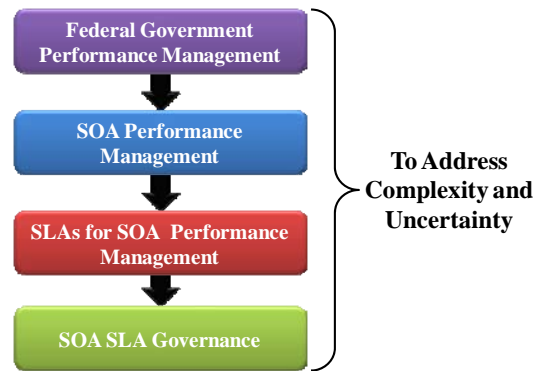


Figure 1. Key Aspects of MITRE's Research

1.0 The Importance of Performance Management

Mechanisms are currently not consistently in place within the Federal Government for programs to identify key stakeholders, quantitatively articulate stakeholder needs, and quantifiably assess, on a timely basis, whether stakeholder needs have been satisfied. The new Administration is currently focused on a key symptom of such improperly functioning mechanisms: lack of transparent accountability. President Barack Obama explained:



My Administration is committed to creating an unprecedented level of openness in Government. We will work together to ensure the public trust and establish a system of transparency, public participation, and collaboration. Openness will strengthen our democracy and promote efficiency and effectiveness in Government. Government should be transparent. Transparency promotes accountability and provides information for citizens about what their Government is doing. Information maintained by the Federal Government is a national asset. My Administration will take appropriate action, consistent with law and policy, to disclose information rapidly in forms that the public can

readily find and use. Executive departments and agencies should harness new technologies to put information about their operations and decisions online and readily available to the public. Executive departments and agencies should also solicit public feedback to identify information of greatest use to the public. (2009)

Over the past year, lackluster demonstration of effective Government performance has resulted in the establishment of new regulations/requirements that compel agencies to more frequently and credibly communicate the value delivered by Government programs in exchange for funds provided by stakeholders. The requirement for a Performance Improvement Officer is one of the provisions of an executive order signed on November 13, 2007, to compel agencies to derive better results from their programs. Agencies will now be required to demonstrate robust performance management efforts, including the development or improvement of strategic plans and aggressive and accurate measurement of progress in achieving overarching performance goals.

Current reporting requirements for programs and expenditures will likely be more closely scrutinized for realism, consistency, accuracy, and alignment with strategic objectives. The

Comptroller General asks federal programs and agencies to improve performance management by:

- Comprehensively reassessing what the federal government does and how it does it: reconsidering whether to terminate or revise outdated programs or services provided.
- Reexamining the beneficiaries of federal programs: reconsidering who is eligible for, pays for, and/or benefits from a particular program to maximize federal investments.
- Improving economy, efficiency, and effectiveness of federal operations: capturing opportunities to reduce costs through restructuring and streamlining federal activities.
- Attacking activities at risk of fraud, waste, abuse, and mismanagement: focusing on minimizing risks and costs. (Mihm, 2000, July 20)

Regardless of whether government programs operate in Information Technology (IT)-intensive environments or not, there is increasing momentum toward sharing of resources, solutions, and risks across government organizations/Agencies. While this trend supports leveraging synergy, reducing stovepipes/redundancy, and economies-of-scale, it often increases acquisition complexity (e.g., multiple new and different relationships to manage) and uncertainty (e.g., nature and magnitude of future demands for supplies/services that are currently being acquired). Given the increased emphasis on transparency and accountability for Federal government expenditures to our ultimate stakeholders (e.g., the taxpayer) in an environment with increased acquisition complexity and uncertainty, foundational steps that we recommend include:

- a) Understanding an organization's own performance with respect to its stakeholders' expectations,
- b) Finding ways to effectively communicate performance in the right form and at the right time to ultimate stakeholders. This allows for expectations to be effectively managed and/or course corrections to be accomplished before resources are unnecessarily expended for too long on objectives that are no longer worthwhile or on solutions that will not succeed, and
- c) Establishing mechanisms to readily re-calibrate performance needs/expectations as the future becomes less uncertain.

We discuss the following recommendations in the context of an SOA environment:

- Application of an ROI-based performance management framework to support sponsors in aligning operational and contract-related performance metrics with monetizable and non-monetizable costs, benefits, and risks deemed critical for achievement of desired outcomes,
- A performance execution process based on SLAs as a key means of communicating and monitoring performance, and
- An SLA governance framework that enables decision-makers to manage SLAs as an on-going re-evaluation of what performance matters to stakeholders.



2.0 SOA Performance Management

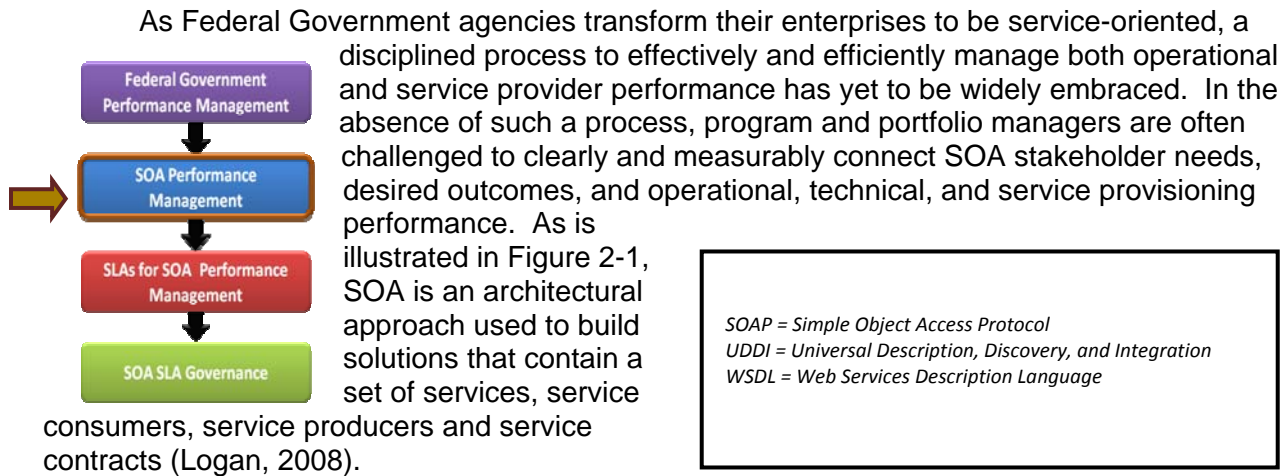


Figure 2-1. The SOA Construct

Through Government case observations and investigation of methodologies successfully employed within commercial industry, the MITRE research team developed a performance management framework—discussed later and shown in Figure 4-1—which guides framework users (e.g., multiple SOA participants in different stages of the SOA lifecycle) through key decisions that will need to be made in effectively and efficiently managing performance of SOA implementations. The SOA (Newcomer & Lomow, 2005) performance management framework helps Government portfolio/program managers and system/performance engineers:

- Measurably articulate expected SOA outcomes and identify outcome drivers,
- Define and monitor technical and acquisition performance metrics through the application of Return-on-Investment (ROI) principles and the on-going comparison of current delivery to initial SOA ROI expectations, and
- Effectively translate operational and overarching government SOA performance objectives into contractor performance management mechanisms.

MITRE's recommendations target critical challenges associated with the increased complexity and uncertainty that are often created by SOA. They also mitigate the risk of measurement overload (i.e., "losing the forest for the trees") by providing a mechanism to derive vital and coherent outcome-focused metrics. These critical challenges are summarized in the paragraphs that follow:

Expectations of Savings without Analysis

For Government agencies and programs that have made decisions to adopt SOA, robust and repeatable methods for effectively and efficiently managing performance over the lifecycle have not emerged. For many Federal Government organizations, there is a mindset that, because SOA is mandated, rigorous investment analysis/management is not necessarily an urgent requirement. The expectation that SOA will save money has resulted in already decreasing funding profiles for programs, increasing the criticality of developing and applying methodologies that result in selection of cost-effective strategies and solutions. These methodologies should directly relate to fulfilling stakeholder needs, closing capability gaps, and achieving multiple outcomes.

Understanding the SOA Lifecycle

One challenge in effectively managing SOA performance is the lack of relevant SOA lifecycle performance benchmarks that Government programs can leverage to determine realistic SOA outcomes and performance thresholds. This lack increases the degree of uncertainty regarding what can realistically be expected from SOA. The current lack of benchmarks is primarily a symptom that (a) many sponsors are still in the initial planning or development stages with SOA and do not have on-going, steady-state results to share yet, and (b) those organizations that do have steady-state performance results often consider the information to be proprietary, requiring close-hold. In the absence of meaningful benchmarks from referent organizations, alternative methods must be implemented by sponsors to evaluate performance of the potentially substantial investments in SOA that will be undertaken by numerous participants in SOA (e.g., SOA developers, service producers, and service consumers).

Measuring Non-fiscal Returns

Our research confirms that SOA expected returns are not always fiscally driven (e.g., compliance with law and regulation or loss of life is more important in many cases), and the SOA construct seeks to align mission and investments that involve promoting a service-oriented culture. As a consequence, the research team proposes an expanded definition of ROI, to include return on closing capability gaps that are targeted by an SOA implementation that includes non-monetizable value propositions such as compliance with law and regulatory mechanisms, avoidance of loss of life and customer (e.g., government user or citizen) satisfaction. This definition is illustrated in Figure 3-1.



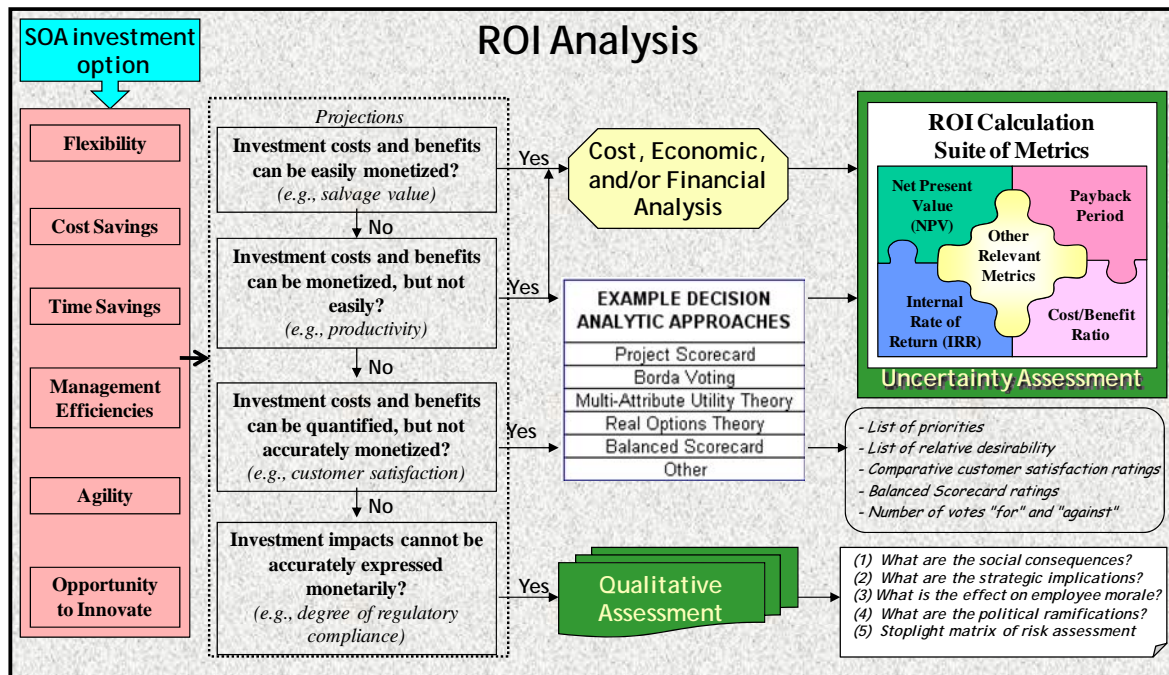


Figure 3-1. ROI Analysis Considerations for SOA

Expectation Management

Application of the expanded ROI methods, in an on-going performance management program, involves comparison of actual *tangible and intangible* results realized from selected SOA investments to realistic, initial investment expectations. Initial expectations, in and of themselves, should reflect an incremental comparison of proposed SOA investment returns to those anticipated should current approaches be continued (i.e., the status quo, or “do nothing” case). The value of ROI analysis for an on-going performance management program must be balanced against the resources required to perform the analysis and will also greatly depend upon the ability of Government sponsors to effectively characterize initial expectations from SOA in measurable terms. According to ZapThink Research, “only by understanding the full range of SOA value propositions can companies begin to get a handle on calculating the ROI of SOA” (Schmelzer, 2005).

Effective SOA Management Can Be Resource-intensive

Application of ROI principles for SOA performance management will likely increase resources devoted to planning and monitoring efforts. ROI analysis can be a relatively resource-intensive effort, and the research team has developed an approach to streamline the process (i.e., “ROI Lite”). This approach involves adoption of an Early Warning System that focuses on more frequent assessment of the “vital few” leading indicators of success/failure. Assessments take the form of variance analyses for key ROI variables (e.g., acquisition costs) and less frequent re-visiting of the overall ROI analysis itself (only required when variances are significant and suggest that either performance needs to be improved or re-baselining is necessary).

Integrating Multiple Perspectives

Another challenge in effectively managing SOA performance is the multitude of conflicting viewpoints regarding key SOA outcomes and which particular SOA-driven benefits can realistically be pursued. This is often the result of confusion in benefit-related terminology (e.g., “flexibility” and “time savings”) and of differing stakeholder needs. For instance, a primary benefit expected from SOA is the ability to expose services for potential re-use by other Government entities, which is typically an enterprise viewpoint; however, an executing program viewpoint could realistically be that the expected benefit from SOA relates to garnering flexibility to quickly respond to a change in the environment. Since SOA supports the exposure of services with the intent of reuse, challenges also include the need to manage multiple inter-Governmental and public-private performance relationships and uncertainty associated with future service demand and performance requirements.

Establishing Stakeholder Targets

The importance of addressing multiple SOA viewpoints, numerous stakeholder needs, and the uncertainty associated with the nature and magnitude of future service demand each increase the complexity associated with acquiring necessary services and capability from other Government entities and commercial industry. Methods that address these limitations, challenges, and pressures for more effective and efficient SOA lifecycle performance management have not been widely adopted within Government settings. Such methods are fundamental to determining whether both SOA *business* (e.g., cost savings through reuse) and *technical* (e.g., flexibility to meet operational needs) targets are being met in a mission-needs context and to manage a more complex stakeholder, provider and consumer environment.

3.0 Applying Service-level Agreements (SLAs) to Manage SOA Service Provisioning



Service-level Agreements (SLAs) have been a highly recommended and time-tested way (in some environments) to establish performance-related agreement between service providers and consumers (other methods, such as Memoranda of Agreement, are typically applied for service provider relationships between Government entities) (GSA, DoD, NASA, 2005). And, effective application of SLAs can help address some of the challenges identified in Section 2.0 (e.g., expectation management, integrating multiple perspectives, and measuring non-fiscal returns). An SLA is a formal, negotiated agreement between two parties. It is a contract between customers and their service providers, and it records the common understanding about service features such as priorities, responsibilities, and guarantees.

The main purpose of the SLA is to articulate agreements reached on the level of service to be provided. For example, it may specify levels of availability, serviceability, performance, operation, or other service attributes, such as billing and even penalties in the case of violation of the SLA (“Service level agreement,” 2007). SLAs have been applied for almost two decades by fixed-line telecom operators as part of their contracts with corporate customers. More recently, some Information Technology (IT) enterprises have adopted the idea of using SLAs with their customers to allow for comparing delivered versus promised quality of service (2007).

Application of Service-level Agreements (SLA) is a recommended, but not required, method to describe performance expectations for services that are acquired by the Government from an external (i.e., commercial industry) service provider, and the use of SLAs is prevalent when services are acquired using Performance-based Acquisition (PBA) techniques.

3.1 Government Experiences in Applying SLAs

Government agency experiences with applying SLAs for managing contract performance objectives have been mixed. In some instances, when SLAs have been applied and performance objectives are not effectively achieved, the primary reason for failure is that the SLAs that were initially created were not consistently applied, maintained, and updated (as necessary) throughout the contract period of performance. In other instances, SLAs fail to support effective performance management because they are managed individually and without sufficient consideration of how all SLAs supporting a particular contract relate to one another to achieve overall outcomes.

SLAs are often exclusively applied as a transactional and computer-generated communication of performance status, which minimizes their inherent power to form binding agreements between parties who may have competing agendas. When efforts are undertaken by the Government to leverage SLAs as a means of achieving and maintaining meeting-of-the-minds between a service provider and consumer, they are often difficult to enforce because of how and when the SLAs were connected to contractually oriented provisioning agreements.

Administration of SLAs often becomes overly resource-intensive, and Government agencies are sometimes motivated to simply replace SLA monitoring efforts with other, potentially less authoritative, monitoring approaches. Alternatively, Government organizations can simply become so involved in SLA administration that they understandably lose sight of performance interdependencies and exactly what performance really should be measured to achieve desired outcomes.

While challenges associated with effective and efficient Government SLA application have existed for many years, the advent of SOA and increased pressures for agile service provisioning in web-enabled environments has added new and more pervasive challenges. In these service-oriented environments, managing delivery against desired outcomes is complex and multi-dimensional, e.g., SLAs may be nested and may be dependent on separate application, hosting, and communications/networks performance needs. The nature and magnitude of future service demand is frequently unclear. And, capabilities will likely be jointly created and maintained by numerous internal and external organizations. The *Federal Acquisition Regulation (FAR)* and other government procurement policies can likely accommodate service-oriented provisioning needs, but comprehensive guidance is not available to support Government organizations in establishing SLA monitoring systems that effectively address performance interdependencies among multiple contributors in achieving overarching capabilities.



3.2 Increasing SLA Effectiveness

To increase the effectiveness of SLAs, they should state in measurable terms:

- The service to be performed and outcome expectations,
- Key Performance Indicators (KPIs) and the level of service that is acceptable for each,
- The manner by which service is to be measured and how “success” is defined,
- The parties involved and the responsibilities of each,
- The reporting guidelines and requirements, and
- Incentives for the service provider to meet the agreed-upon target levels of quality.

Figure 3-2 illustrates recommended relational SLA elements.

SLA Element	Description
2.1 CONTEXT	
Purpose/Background	Description of what the SLA has been designed to accomplish
Stakeholders	Identifies who cares about this performance and what they care most about
Service Interdependencies	Explains how the SLA and work scope fit into the entire supply chain
2.2 SCOPE OVERVIEW	
Business Scope and Objectives	A high level description of the SLA's business objectives
2.3 SERVICE DESCRIPTIONS	
Service Descriptions	Detailed description of the services being provided through the agreement
2.4 KEY PERFORMANCE INDICATORS	
Service Levels/Performance Metrics	Required performance and how service is to be delivered
Data Requirements	Data to be provided by the contractor to enable performance monitoring
Security Management	Security issues relevant to services provided
Workload Constraints	Highest expected level of service demand. Degradation schedule if excessive demand
Severity and Priority Levels	Severity levels for service interruption/degradation; service restoration priorities
2.5 ROLES AND RESPONSIBILITIES	
Roles and Responsibilities	Mutually agreed upon roles along with corresponding responsibilities for each team member
2.6 RECOURSE/REWARD SCHEME	
Excused Performance	Conditions under which the contractor will not held to the Absolute KPIs
Escalation Procedures	What actions to take if service delivery is not satisfactory
Service Level Bonuses/Penalties	Consequences for failing to meet Absolute KPIs; rewards for superlative performance
2.7 REPORTING GUIDELINES AND REQUIREMENTS	
Required Performance Reports	Vendor's performance reports to be delivered to government
Update Procedures	How, how often, and by whom, SLA should be updated
Issues Management Procedures	Responsibilities for surfacing and resolving problems/issues
2.8 GLOSSARY	
Glossary of Terms	Written to minimize misinterpretations

Figure 3-2. Recommended Relational SLA Elements

Key SLA lessons learned that should be considered include:

- **Agree to existing service levels:** Some Government agencies agree that the required service levels will be set at existing performance. Doing so preserves the current service that the new contract was designed to improve (Delaney, 2004).
- **Agree to agree on service levels:** Some Government agencies agree to work out service levels after contract award (2004). However, once the contract is signed, the deal team often breaks up, and the provider may not be incentivized to subsequently agree to challenging service levels.
- **Agree to fix service levels at initial provider performance:** Some Government agencies, with no basis for setting service levels, agree to set them at whatever levels the provider can achieve during the initial months of the contract. This can give the provider an incentive to hold down service levels during those initial transitional months, that is, during a potentially volatile time in the contract term (2004).
- **Set the appropriate incentives:** Some Government agencies overlook the idea that the provider will "manage to the money." For example, in a call center contract, agencies might set a service level of "answer 90% of calls within two minutes" without realizing that they are, in effect, telling the provider to ignore any call that's gone over two minutes in favor of one that could still be answered in two minutes (2004).
- **Don't ask for the moon:** Government agencies should be careful about requiring unnecessarily high performance commitments. Providing better service may require the provider to use, for example, redundant systems, excess capacity and better technology (2004).
- **Realize less is more:** Government agencies should make SLAs simple and familiar.
- **Make SLAs measurable and actionable:** Agencies should only collect data upon which they are going to base decisions; they should then pre-set the actions that will be followed if metrics do not hit targets.
- **Detail the unusual areas and boiler plate the rest:** "Must-haves" should be articulated in the contract itself.
- **Describe methods for withholding/reducing fee:** Loss of business/productivity is rarely compensated directly by a service provider. Typically, a rebate proportional to the shortfall of the service vs. the payment is provided by the service provider in future performance evaluation periods. SLAs typically include escalation procedures and conditions under which the provider will not be held responsible for service failings.
- **Incorporate contract language that allows SLAs to be changed:** This language should tie to milestones as SLA changes may impact cost/schedule.

Key reasons for failure of SLAs include: (a) The Government lacks well-defined requirements at the time of Request for Proposal (RFP) issuance, and (b) When Government/contractor performance interdependencies exist, the Government must have enough solid data on its own performance to counter contractor challenges.

3.3 SLA Considerations for SOA Environments

Ideally, IT and business stakeholders must work together to define realistic service-level criteria for SOA, especially for web services (Wainwright, 2003). While traditional infrastructure SLAs typically measure "feeds and speeds," SOA SLAs will often need to measure completed events. Blending IT and business factors will require dialogue and feedback, which can be used to inform the performance measurement and management processes. While the notion of measuring up to specific technical performance benchmarks is



well-established in the IT industry, the idea of defining service-level objectives in terms of business factors is less familiar. Preparing and executing an SLA in a SOA environment presents special challenges. Government organizations should follow some basic steps when they craft and manage SLAs in an SOA environment to mitigate risks associated with complexity and uncertainty (Perera, 2008).

- **Define desired outcomes:** SLAs can support an articulation of desired outcomes between business and technology sides of the organization (2008). And, it is recommended that SLAs align with the overall Concept of Operations (CONOPS). By design, an effective CONOPS will define the operational concept relative to overall objectives and will support an understanding of key interdependencies. In a SOA environment, people should consider, from the outset, alternatives to business as usual. Certainly, people can use SOA to perform the same business tasks that previous software performed, but this perpetuation can ignore the opportunities that SOA is supposed to create for flexibility and adaptability to changing business needs.
- **Match technical requirements to business needs:** Software designers must select performance indicators for technical services, including service availability, bandwidth and response times. Forrester Research uses the analogy of a consumer using an automated teller machine to explain how technical SLAs should be crafted. “It’s not enough that you put your card and Personal Identification Number (PIN) [in the machine] and request to withdraw cash. There’s an expectation of how fast that will happen, the level of reliability and the level of security” (Perera, 2008).

Varied business needs require different technical thresholds. A military targeting application requires the highest levels of availability, whereas a civilian data analysis tool can probably operate at degraded performance levels outside of normal working hours.

Because SOA applications have many loosely coupled services, SLAs can get complicated. For example, software designers need performance guarantees if they’re going to reuse a service. In that case, a technical SLA between the service provider and the service consumer will be necessary. Each individual service might be in compliance with its technical SLA, and yet the overall application could still fail to meet its performance benchmarks. SLAs cannot be an afterthought; they should become part of the system engineering process that occurs when SOA application developers are selecting services to incorporate or reuse. “However, from a user standpoint, a SOA application should have one SLA” (2008).

- **Monitor performance:** A technical SLA provides information as to what performance is expected from a SOA application, but how does one know if the application meets that benchmark? DISA’s Net-Centric Enterprise Services (NCES) program created a SOA framework, a structured method for monitoring all service information going back and forth. According to Computer Sciences Corporation (CSC), “The common framework captures [...] service information regardless of the program or organizational entity” (Perera, 2008). “Performance monitoring is an essential step in avoiding pass-the-buck arguments about who is responsible for performance failures. Consider a scenario in which a service provider agrees to accept 10,000 consumer data queries in an hour. The consumer’s service information shows that the queries are not exceeding that level, but the application isn’t responding. Logs show that the consumer sent batches of 10,000 requests in ten seconds in hourly pulses, and batch processing wasn’t part of the original SLA” (2008).



- **Enforce the agreement:** An agreement to provide service without a mechanism to penalize noncompliance is not much of an agreement. **But, this can sometimes occur with SOA SLAs.** “A user agency could say it has an SLA that guarantees performance levels, but a provider agency could argue that Congress doesn’t intend for the money it appropriates to the provider agency to be used to fix another agency’s IT problems” (2008). Although under various laws, notably the *Economy Act of 1933*, agencies can contract for services from another agency, the law when applied to SOA “gets into some sticky areas that are way out of the purview of IT people,” said Randy Hite, director of IT architecture and systems issues at the Government Accountability Office (GAO). “It starts getting lawyers involved.” Partly because of those legal and funding issues, SOA studies show that only 5% of reusable services actually are reused (2008). It’s easy to find examples of organizations failing to fulfill their SLA agreements. For that reason, SLAs in the federal government are most effective within a single organization whose various parts are supported by the same source of funding. Not going outside the organization for reusable services is perceived as prudent. That constraint doesn’t necessarily apply to contracting with vendors for SOA services. Government agencies can try to financially penalize a vendor for reusable services that fall short of agency expectations. However, vendors are not eager to assume extra responsibility without getting paid (2008).

4.0 A SOA SLA Governance Framework



Government agencies should consider adopting an SLA governance framework to ensure that SLAs can be as effective as possible in managing performance and achieving overall outcomes. Such a framework can help rationally manage all the individual performance agreements and monitoring activities, especially when the Government is contracting for multiple and/or complex services. SLA governance is the ongoing process of reviewing performance measures and contrasting those results to the stated goals and targets. Objectives of an SLA governance framework are to ensure that:

- Performance standards, as communicated through SLAs, provide a clear understanding of how well the contractor is achieving overall service contract goals;
- SLAs continue to describe performance deemed critical at the moment to achievement of overall outcomes;
- SLAs and performance measures are prioritized according to their importance in achieving overall outcomes; and
- All activities and surveillance are undertaken as effectively as possible in order to assess how effectively the provided services support the overall desired outcomes.

Figure 4-1 illustrates the purpose, goals, and key success drivers of an SLA governance framework.

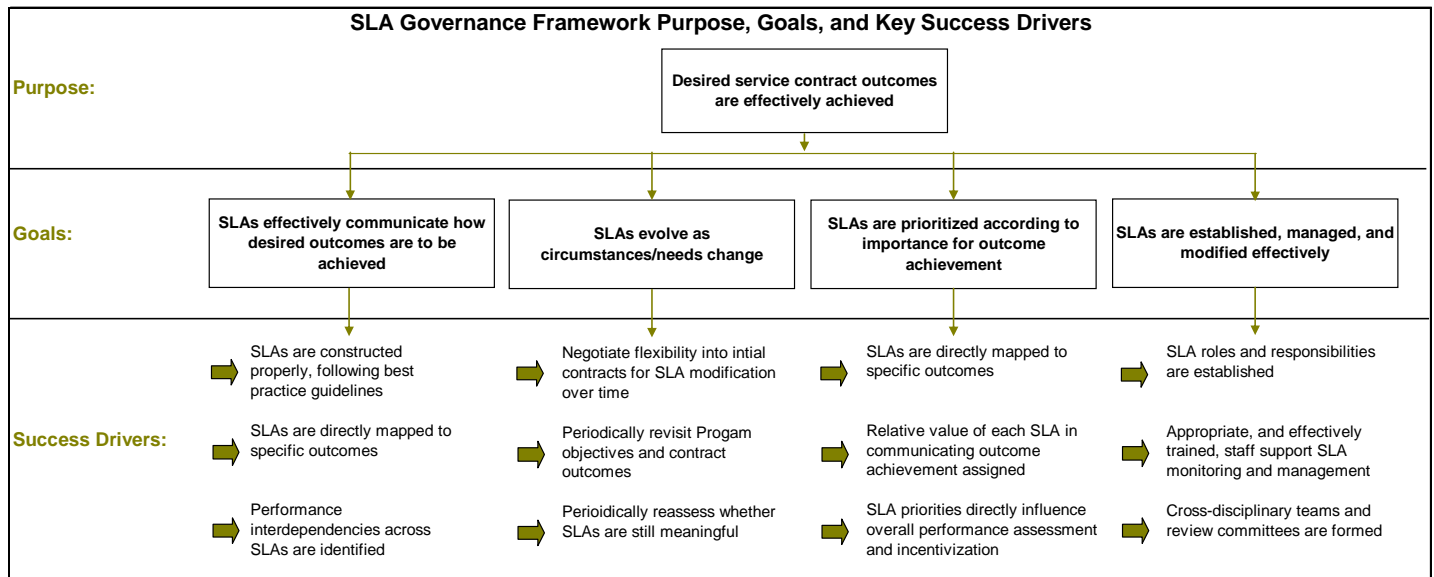


Figure 4-1. SLA Governance Framework Purpose, Goals, and Key Success Drivers

An SLA governance framework should be designed so that all SLAs currently being applied to monitor performance:

- Meaningfully describe progress toward achievement of specific outcomes in the context of overall contract objectives and in consideration of SLA interdependencies that may exist; and
- Are objectively measured at the appropriate times and continually serve as the primary mechanism for objectively determining service provider payment and incentives (both positive and negative).

The framework should assist Government leaders, contracting personnel, and Program Managers in consolidating, synthesizing, and rationalizing information related to service performance on a continuous basis—in such a way that performance status can be accurately determined at any point in time and readily translated into a robust characterization of how effectively vital outcomes are being achieved. The SLA governance framework should clearly identify key service provisioning stakeholders, their performance expectations, and if/how their performance expectations are being satisfied. The framework should enable the maintenance and improvement of service quality through a continuous cycle of agreeing, monitoring, and reporting upon service achievements and instigation of actions to eradicate poor service. To be effective, the SLA governance framework should define roles and responsibilities for performance measurement and management. The framework should also define the types of performance reviews that need to be conducted and the timing of these reviews.

SLA governance does not begin when the SLA itself is documented; rather, governance refers to managing the entire process throughout the acquisition lifecycle. The initial evaluation of current practices before the document is started, the writing of the SLA, the determination of key SLA participants and associated roles/responsibilities, the monitoring of the effort's progress, as well as the need for any changes or updates to the agreement are all part of the governance process. This framework provides guidance for those leaders within the

Government who are responsible for overseeing this process to ensure that the goals laid out in the SLA are realized. The government and service providers must manage the relationship on an on-going basis by continuously monitoring performance, changing business needs and updating benchmarks. At regularly agreed-upon intervals, the government should determine whether existing contracts need to be modified and new SLAs drafted. Figure 4-2 details the proposed governance framework and the steps included in each of the four stages—Prepare, Create, Monitor and Update.

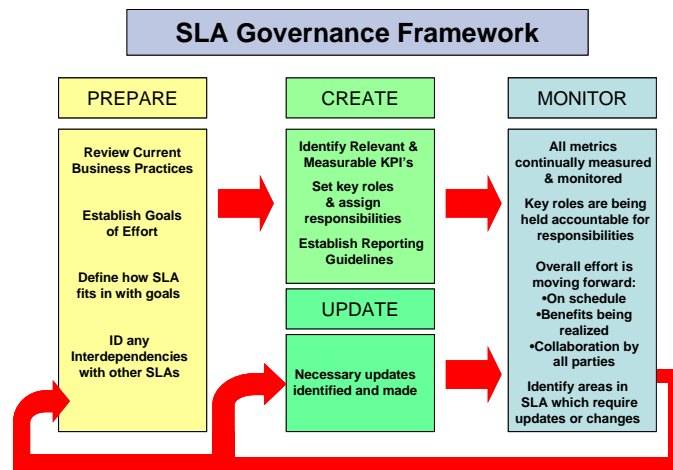


Figure 4-2. Proposed SLA Governance Framework

Essential steps to successful SLA management include:

- Define a service in understandable language. This is the service. This is what it means. This is what is supported and what is not supported. This is how it will be reported, communicated, charged.
- Understand the costs at a granular level, identifying all the different cost elements involved in the delivery of a service. This will give IT the ability to also execute improvement programs aimed at further reducing these costs.
- Price the service delivery accordingly. There will be projects in the future for which the business may not immediately see the value. So price some of the services to allow for some buffer to pay for these yet-to-be-accepted services.
- Implement differentiated charge-backs to reflect the differentiated levels of service you have on offer.
- Have regular service reviews. Reviews are a communication and marketing mechanism for IT to show to business how it is improving and helping the business. Identify what else is needed by the business through this dialogue. A feedback loop is thus created in which both business and IT are able to help each other improve ("Managing," 2007).

5.0 Conclusions

Mechanisms are currently not consistently in place within the Federal Government for programs to identify key stakeholders, quantitatively articulate stakeholder needs, and quantifiably assess, on a timely basis, whether stakeholder needs have been satisfied. The Comptroller General asks federal programs and agencies to improve performance management by:

- Comprehensively reassessing what the federal government does and how it does it; reconsidering whether to terminate or revise outdated programs or services provided.
- Reexamining the beneficiaries of federal programs; reconsidering who is eligible for, pays for, and/or benefits from a particular program to maximize federal investments.
- Improving economy, efficiency, and effectiveness of federal operations; capturing opportunities to reduce costs through restructuring and streamlining federal activities.
- Attacking activities at risk of fraud, waste, abuse, and mismanagement; focusing on minimizing risks and costs. (Mihm, 2000, July 20)

MITRE research on performance management has resulted in recommendations to: (1) apply ROI analysis principles as the foundation for more effective performance management of Government SOA, (2) create comprehensive SLAs to articulate agreements between the Government and external service providers, and (3) manage SLAs through a governance framework.

SOA involves multiple and complex participants (e.g., SOA developers, service providers, service consumers) and organizations (e.g., multiple Government organizations and commercial industry). It also involves potential uncertainty associated with future performance expectations as services are exposed through the SOA; the nature and magnitude of future demand for services will likely not be known with certainty at the outset. Careful planning must be undertaken by Government organizations to determine outcomes for multiple stakeholders and determine how those outcomes are translated to performance expectations that will be communicated to service providers.

If SLAs are applied to support on-going SOA performance management, then efforts should be undertaken to directly connect these SLAs with technical performance requirements and ultimate SOA expectations. The SLAs should be carefully crafted to ensure that flexibility for the Government to evolve performance expectations is maximized.

For SLAs to be effective, a disciplined governance process must be undertaken by sponsors to ensure that the SLAs are actually measured and monitored. On a timely basis, the SLAs should be re-evaluated to determine whether they are actually measuring something of importance and are still relevant to outcomes.

The problem with SLAs is that once the ink has dried, the provision, monitoring, and management of these agreements can become the bone of contention between the people who are left to execute, monitor and manage the contract. The need to manage SLAs is becoming a necessity if SLAs are to achieve any semblance of success. Without management, SLAs are like cars that go wildly off a highway. You need checks



and balances to make sure that all concerned are running in the same direction and hopefully meeting all the obligations set forth in the contract. ("Managing," 2007)

With a performance management program in place, well-written and governed SLAs support government programs and provide transparent accountability to their stakeholders. Transparent accountability can support the Government in addressing challenges associated with complexity and uncertainty.

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Appendix A. Acronyms

CSC	Computer Sciences Corporation
CONOPS	Concept of Operations
DISA	Defense Information Systems Agency
<i>FAR</i>	<i>Federal Acquisition Regulation</i>
FCW	Federal Computer Week
GAO	Government Accountability Office
IT	Information Technology
KPI	Key Performance Indicator
MOIE	Mission-oriented Investigation and Experimentation
NCES	Net-centric Enterprise Services
PBA	Performance-based Acquisition
PIN	Personal Identification Number
RFP	Request for Proposal
ROI	Return on Investment
SLA	Service-level Agreement
SOA	Service-oriented Architecture



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2003 - 2009 Sponsored Research Topics

Acquisition Management

- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- BCA: Contractor vs. Organic Growth
- Defense Industry Consolidation
- EU-US Defense Industrial Relationships
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Managing Services Supply Chain
- MOSA Contracting Implications
- Portfolio Optimization via KVA + RO
- Private Military Sector
- Software Requirements for OA
- Spiral Development
- Strategy for Defense Acquisition Research
- The Software, Hardware Asset Reuse Enterprise (SHARE) repository

Contract Management

- Commodity Sourcing Strategies
- Contracting Government Procurement Functions
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Model for Optimizing Contingency Contracting Planning and Execution
- Navy Contract Writing Guide
- Past Performance in Source Selection
- Strategic Contingency Contracting
- Transforming DoD Contract Closeout
- USAF Energy Savings Performance Contracts
- USAF IT Commodity Council
- USMC Contingency Contracting

Financial Management

- Acquisitions via leasing: MPS case
- Budget Scoring
- Budgeting for Capabilities-based Planning
- Capital Budgeting for DoD



- Energy Saving Contracts/DoD Mobile Assets
- Financing DoD Budget via PPPs
- Lessons from Private Sector Capital Budgeting for DoD Acquisition Budgeting Reform
- PPPs and Government Financing
- ROI of Information Warfare Systems
- Special Termination Liability in MDAPs
- Strategic Sourcing
- Transaction Cost Economics (TCE) to Improve Cost Estimates

Human Resources

- Indefinite Reenlistment
- Individual Augmentation
- Learning Management Systems
- Moral Conduct Waivers and First-term Attrition
- Retention
- The Navy's Selective Reenlistment Bonus (SRB) Management System
- Tuition Assistance

Logistics Management

- Analysis of LAV Depot Maintenance
- Army LOG MOD
- ASDS Product Support Analysis
- Cold-chain Logistics
- Contractors Supporting Military Operations
- Diffusion/Variability on Vendor Performance Evaluation
- Evolutionary Acquisition
- Lean Six Sigma to Reduce Costs and Improve Readiness
- Naval Aviation Maintenance and Process Improvement (2)
- Optimizing CIWS Lifecycle Support (LCS)
- Outsourcing the Pearl Harbor MK-48 Intermediate Maintenance Activity
- Pallet Management System
- PBL (4)
- Privatization-NOSL/NAWCI
- RFID (6)
- Risk Analysis for Performance-based Logistics
- R-TOC Aegis Microwave Power Tubes



- Sense-and-Respond Logistics Network
- Strategic Sourcing

Program Management

- Building Collaborative Capacity
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Collaborative IT Tools Leveraging Competence
- Contractor vs. Organic Support
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Managing the Service Supply Chain
- Measuring Uncertainty in Earned Value
- Organizational Modeling and Simulation
- Public-Private Partnership
- Terminating Your Own Program
- Utilizing Collaborative and Three-dimensional Imaging Technology

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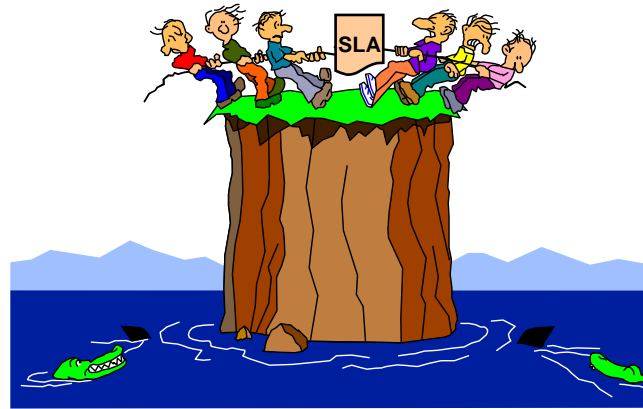




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Outcome-Driven Service Provider Performance under Conditions of Complexity and Uncertainty



***6th Annual Acquisition Research Symposium
The Graduate School of Business & Public Policy, Naval Postgraduate School
May 13-14, 2009 (Monterey, California)***

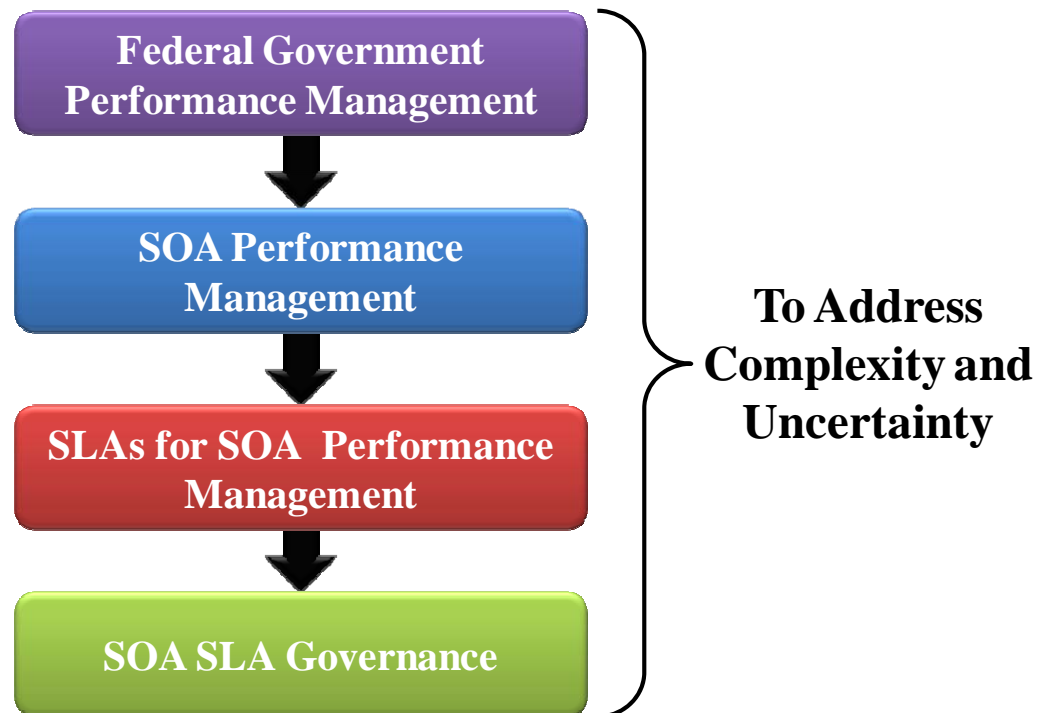
**Stakeholder-Driven Performance Management
Mission-Oriented Investigation and Experimentation (MOIE)**

Kevin S. Buck, E523 (kbuck@mitre.org), 443-636-5380

Diane Hanf, E060 (ghanf@mitre.org), 339-223-5380

Agenda

- n Purpose and Context
- n Key Discussion Topics:



- n Conclusions
- n Questions?

Purpose and Context

□ Purpose

- Describe application of Return-on-Investment (ROI) analysis for SOA performance management
- Discuss use of SLAs to articulate agreements between the Government and external service providers in SOA environments
- Recommend an SLA Management governance framework

□ Context

Summarizes results-to-date of MITRE Corporation (MITRE) research efforts:

- Stakeholder-Driven Performance Management
 - n **K. Buck, L. Oakley-Bogdewic**
- SOA Performance Measures Expression in Performance-Based Acquisition (PBA) Vehicles
 - n **D. Hanf, K. Buck**

Performance Management – Federal Focus



❑ Objectives must be outcome-driven

- Complying with performance reporting is insufficient
- Derive outcomes from stakeholder-articulated statements

■ Mission, vision, and strategic/transition

❑ Use a shared responsibility model

- Program/portfolio/contract managers all have vested interest

❑ Federal government has a lackluster performance management track record

- Clearest evidence: failed programs (failure to deliver or significant over-budget/over-schedule delivery)

❑ Performance management is challenging for the federal government

- Challenges became greater with dependencies on non-controlled resources, e.g., networks
- Service-Oriented Architecture (SOA) significantly increases dependencies
 - Uncertainty and/or complexity increase
 - Data and functions now added to the non-controlled resource pool



Key hypotheses

<i>If</i>	<i>Then</i>	<i>So,</i>
Complexity ↑	# of moving parts and relationships ↑	Focus more on interdependencies
Uncertainty about the future ↑	Chances of reducing uncertainty over time ↑	Plan for contingencies and garner flexibility
% of DoD IT spending contracted out ^[1] = 79.3%	Contract performance impact on IT performance = significant	Manage IT delivery as a tight linkage between contract and overall performance

^[1] Paul A. Strassmann, *Budgeting DoD Information Technologies*, 11 September 2008

SOA Performance Management

□ SOA definition

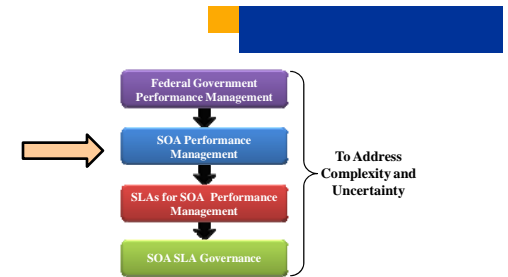
- An architectural approach used to build solutions
- Consists of a set of services, service consumers, service producers and mechanisms for discovery and establishing contracts

□ SOA helps organizations share resources, and it increases:

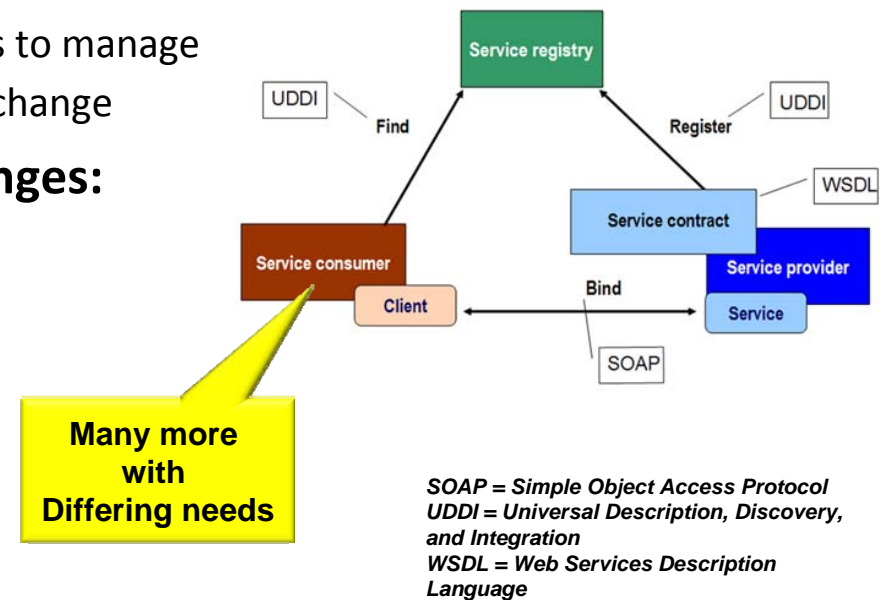
- Acquisition complexity: multiple relationships to manage
- Uncertainty regarding when resource needs change

□ SOA performance management challenges:

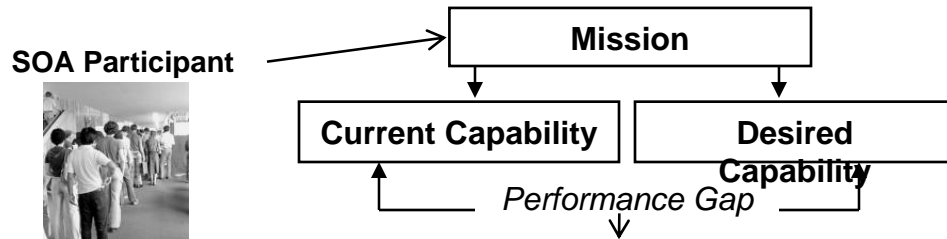
- Expecting savings without analysis
- Understanding the SOA lifecycle
- Measuring non-fiscal returns
- Managing expectations
- Effectively managing SOA is resource-intensive
- Integrating multiple perspectives
- Establishing stakeholder targets



SOA Construct

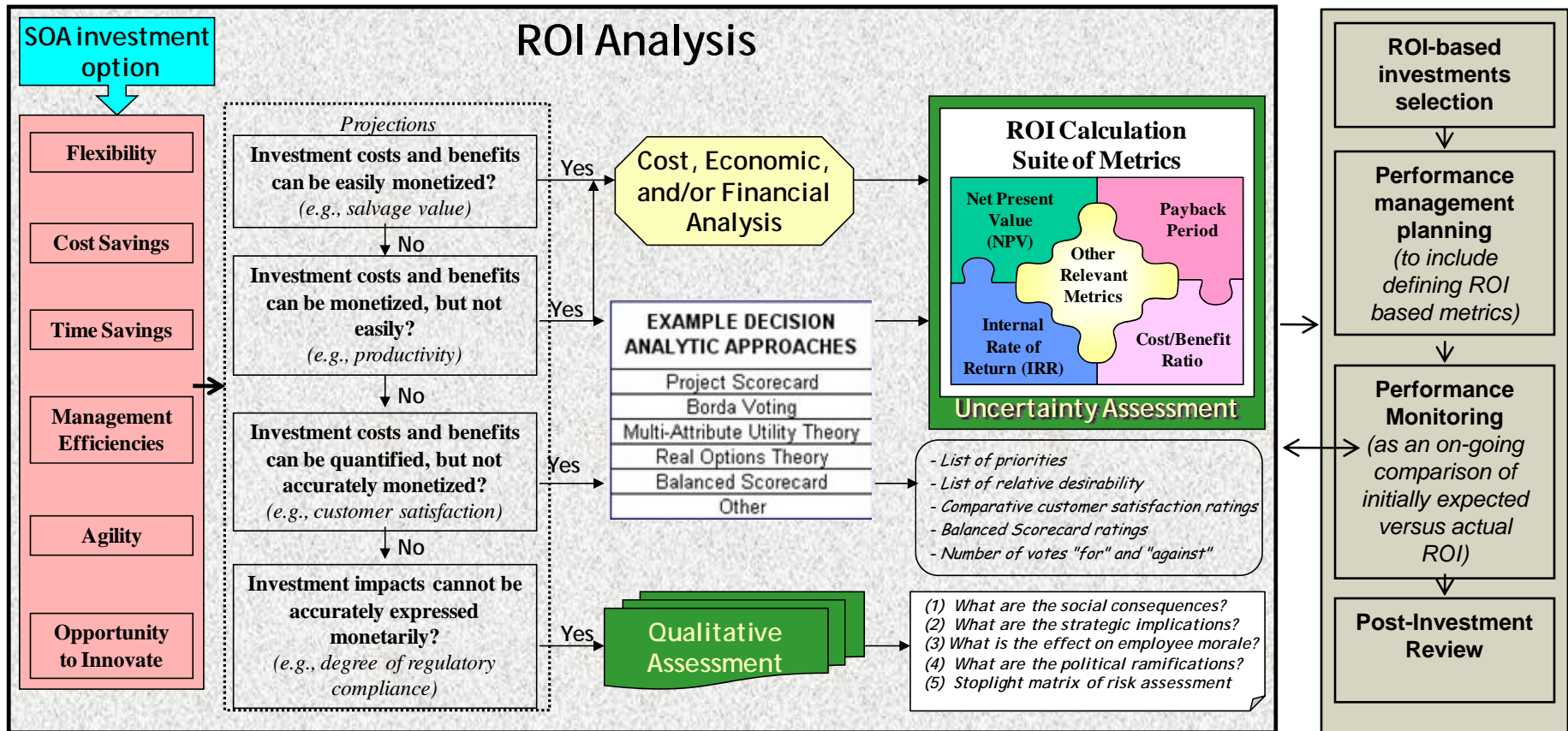


- Without credible and relevant benchmarks for what performance can be expected from your SOA participation, how will you assess SOA performance?



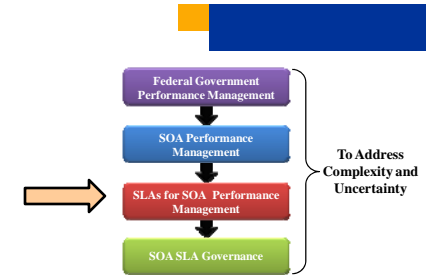
*ROI calculation =
what we learned in finance class*

*ROI analysis =
ROI calculation + assessment of intangibles*





Applying SLAs to Manage SOA Service Provisioning



- ❑ **SLAs are a means to establish performance-related agreements between service providers and consumers**
- ❑ **An SLA is a formal negotiated agreement between two parties**
 - A “contract” between customers and their service providers
 - Records the common understanding about service features
- ❑ **Government experiences in applying SLAs:**
 - Results have been mixed, often depending on whether the SLAs were:
 - n **Consistently applied, maintained and updated**
 - n **Managed with awareness of interdependent SLAs’ performance needs**
 - n **Computer transaction-based vice an accurate vehicle for consumer-provider communication**
 - “Losing the forest for the trees”
 - n **SLA administration focus vice continuous assessment as to whether desired outcomes are being achieved**

Applying SLAs to Manage SOA Service Provisioning

□ Transactional versus Relational SLAs

- Transactional
 - Measures moment-in-time performance indicators (e.g., throughput), typically in an automated fashion
- Relational
 - Why performance levels are needed
 - Parties' agreement about performance standards
 - Rationale for thresholds
 - Recourse for performance lapses

Relational SLA Elements

CONTEXT
Purpose/Background
Stakeholders and how this SLA supports their needs
Service Interdependencies
SCOPE OVERVIEW
Business Scope and Objectives
SERVICE DESCRIPTIONS
KEY PERFORMANCE INDICATORS
Service Levels/Performance Metrics
Data Requirements
Security Management
Workload Constraints
Severity and Priority Levels
ROLES AND RESPONSIBILITIES
RECOURSE/REWARD SCHEME
Excused Performance
Escalation Procedures
Service Level Bonuses/Penalties
REPORTING GUIDELINES AND REQUIREMENTS
Required Performance Reports
Update Procedures
Issues Management Procedures
GLOSSARY OF TERMS

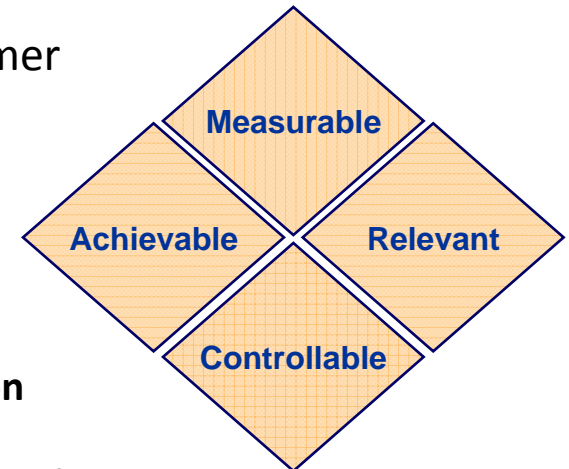
Applying SLAs to Manage SOA Service Provisioning



- **SLAs are most effective if stated in measurable terms and include**
 - Stated expectations of outcomes
 - Derived Key Performance Indicators (KPIs) with outcome-supported service levels
 - Defined measurement mechanisms and what determines “success”
 - Parties involved and their responsibilities
 - Reporting guidelines and requirements
 - Service provider incentives for meeting agreed-upon levels of quality

- **Checklist for determining if SLAs are effectively supporting objectives:**

- ☒ SLAs articulate a definitive performance provider-consumer agreement
- ☒ SLAs clearly align with overall enterprise performance objectives
 - Align decision frameworks, documents, and contract artifacts
 - Involves diligent configuration control and communication
- ☒ SLAs allow for re-negotiation if future conditions significantly change



Applying SLAs to Manage SOA Service Provisioning

□ Key reasons for SLA failure:

- Lack of well-defined requirements at the time of RFP issuance
- When performance interdependencies exist, each party must have solid data on its own performance to counter challenges

□ Key SLA lessons learned ^[1] :

[1] "The Outsourcing Revolution, 2004: Protecting Critical Business Functions", J. Delaney

- Agree to pre-existing service levels
 - n **Some Government agencies agree that the required service levels will be set at pre-existing performance levels. By doing so, they preserve the current service that the new contract was designed to improve**
- Agree to service levels before contract award
 - n **There is little incentive to uphold post-contract award agreements**
- Do not agree to fix service levels at initial provider performance
 - n **This reduces flexibility and incentive to get better performance if future needs are not known**
- State incentives appropriately
 - n **Ensure incentives reinforce positive behavior expectations**
- Don't ask for the moon
 - n **Performance should be critically examined and consider cost drivers**

Applying SLAs to Manage SOA Service Provisioning

□ More key lessons learned

- Less is more—make SLAs simple and familiar
- Make SLAs measurable and actionable
 - n **Collect data to be acted on**
 - n **Predetermine actions to be undertaken when metrics fall short**
- Detail the unusual areas and boiler plate the rest
 - n **“Must haves” should be articulated in the contract itself**
- Describe methods for withholding/reducing fee
 - n **Loss of business/productivity is rarely compensated directly**
 - Typically, a rebate proportional to the shortfall is used
 - n **SLAs typically include escalation procedures and conditions under which they are invoked**
- Incorporate contract language that allows SLAs to be changed
 - n **This language should tie to milestones as SLA changes may impact cost/schedule**

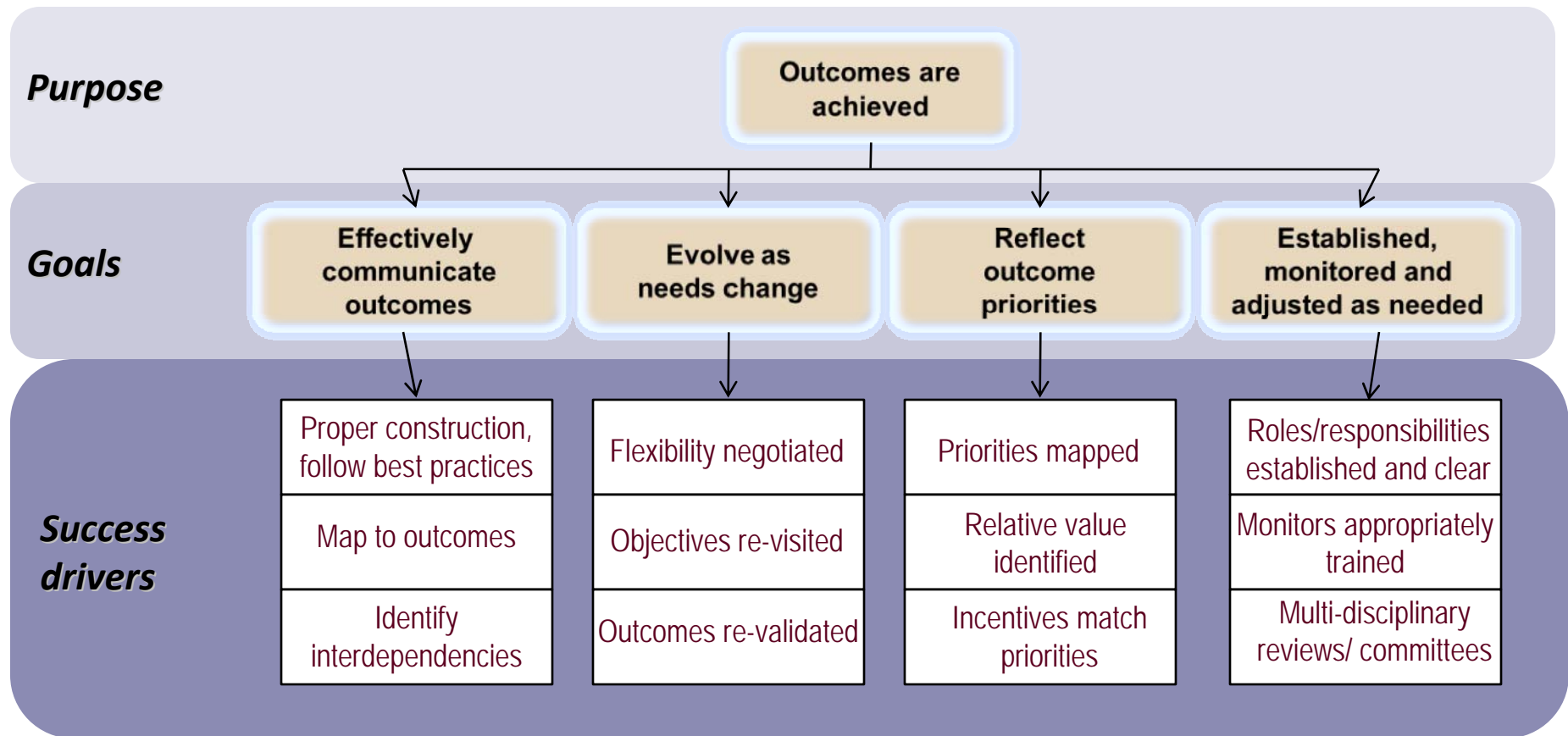
- ❑ **SLA governance is the ongoing process of reviewing performance measures against stated goals and targets and reassessing SLA value**
- ❑ **The ultimate objectives of an SLA governance framework are to ensure:**
 - Performance standards are established to meet overall contract goals
 - SLAs continue to describe performance deemed critical to overall outcomes
 - SLAs and performance measures are prioritized
 - All activities and surveillance are undertaken as effectively as possible
- ❑ **What we are trying to avoid with an SLA Governance Framework?**

Per the Government Accountability Office (GAO) in reviewing Navy-Marine Corps Intranet (NMCI) performance: “The Navy defined strategic goals for its NMCI program and developed a plan for measuring and reporting on achievement of these goals. However, the Navy did not implement this plan, choosing instead to focus on defining and measuring contractually specified SLAs. Program officials did not have performance data to demonstrate progress in relation to strategic goals. Without effective performance management, the Navy is increasing the risk that the program will continue to fall short of its goals and expected results.”

GAO-07-51, December 2006, pp. 18-19.

SOA SLA governance goals and success drivers

SLA Governance Framework



SOA SLA Governance

- GAO report ^[1] on NMCI effort strongly suggests that downside risk associated with SLAs is “getting lost in the trees for the forest”

[1] GAO Report GAO-07-51. “DOD Needs to Ensure That Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers”

- Suggested SLA Governance Framework to ensure SLAs are effectively managed and align with expected outcomes:

